

**PATENT APPLICATION**  
**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Docket No: Q77210

FUNAKOSHI, Hajime, et al.

Divisional of Appln. No.: 10/053,674

Group Art Unit: Not Yet Assigned

Confirmation No.: Not Yet Assigned

Examiner: Not Yet Assigned

Filed: September 24, 2003

For: IRON SULFIDES, PROCESSES FOR PRODUCING THE SAME, IRON SULFIDE MIXTURE, HEAVY METAL TREATING AGENT, AND METHOD OF TREATING WITH THE AGENT

**INFORMATION DISCLOSURE STATEMENT**  
**UNDER 37 CFR §§ 1.97 and 1.98**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure under 37 CFR §1.56, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents which are listed on the attached PTO/SB/08 A & B (modified) form which are all the references of record in parent application No. 10/053,674. Applicant is not submitting duplicate copies of these references but requests that they be listed on the face of any patent granted on the above application. (See 37 CFR §1.98(d)). Copies of any cited copending applications, if not previously submitted, are being submitted herewith.

In compliance with the concise explanation requirement under 37 C.F.R. § 1.98(a)(3) for foreign language documents, Applicant submits the following explanations:

INFORMATION DISCLOSURE STATEMENT  
Divisional of U.S. Appln No. 10/053,674

JPA Nos. 49-43472, 47-31806, 50-13294 and 50-96053 are disclosed on page 1 of the specification in the above-identified application.

JPA Nos. 52-126685, 60-227881, 49-31152, 52-113559, 52-148473, 53-102273 and 48-11291 are disclosed on page 2 of the specification of the above-identified application.

JP-48-59005

This reference discloses a method of capturing heavy metals using an iron sulfide slurry obtained by reacting iron (II) salt with sulfur ion. The present invention prepares an iron sulfide slurry by reacting iron (II) salt with an alkaline earth metal, and filtering, washing, drying and pulverizing the same to form an iron sulfide powder having excellent durability, and uses the powder in heavy metal treatment.

This reference also discloses that heavy metal treatment activity is further improved by adding an alkaline earth metal compound or an aluminum compound to the iron sulfide slurry. However, this reference does not disclose a durability improvement effect. The present invention uses the alkaline earth metal to improve durability properties of the iron sulfide powder. Aluminum does not have durability improvement effect, and the present invention does not use the same.

JP-A-53-122673

This reference discloses treatment of hexavalent Cr in a granular material by sodium sulfide to the granular material containing hexavalent Cr, adding a water-soluble iron (II) salt thereto subsequently or simultaneously, and kneading the resulting mixture under water content of 5-35% wt%. However, this reference does not contain any disclosure regarding iron sulfide

INFORMATION DISCLOSURE STATEMENT  
Divisional of U.S. Appln No. 10/053,674

having excellent durability. The present invention is that in the case of treating dusts containing hexavalent Cr, a heavy metal treating agent comprising a novel iron sulfide as the effective ingredient is added to the dusts, if necessary water is added thereto, and the mixture is kneaded to treat hexavalent Cr.

JP-A-63-111990

This reference discloses that sulfiding agent and water are added to flying ash to waste incineration to make a water content of 18-30%, and kneading the mixture of convert heavy metals in the flying ash to sulfides, thereby stabilizing the same. This reference merely exemplifies water-soluble sulfides such as sodium hydrosulfide as a sulfiding agent, and does not contain any disclosure regarding a heavy metal treating agent comprising a novel iron sulfide having excellent durability as the effective ingredient. The present invention is that a heavy metal treating agent comprising a novel iron sulfide having excellent durability as the effective ingredient and water are added to a flying ash of waste incineration, and the resulting mixture is kneaded to treat heavy metals contained in the flying ash.

JP-A-52-148473/1977:

Applicants have provided the claims of Canadian Patent 1069626, which corresponds to JP-A-52-148473 (a copy of which was listed and provided in the January 24, 2002 (IDS).

INFORMATION DISCLOSURE STATEMENT  
Divisional of U.S. Appln No. 10/053,674

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application.

Respectfully submitted,



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WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

Date: September 24, 2003

Substitute for Form 1449 A &amp; B/PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT***(use as many sheets as necessary)**Complete if Known*

Divisional of Application Number	10/053,674
Confirmation Number	Not Yet Assigned
Filing Date	September 5, 2003
First Named Inventor	FUNAKOSHI, Hajime
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Attorney Docket Number	Q77210

Sheet

1

of

1

**U.S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Document Number		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
		Number	Kind Code <sup>2</sup> (if known)		
		US 3,740,331		6/19/73	John R. Anderson et al.
		US 4,102,784		7/25/78	Schlauch
		US 5,494,703		2/27/96	Evangelou
		US 5,877,393		3/2/99	Webster
		US 6,153,108		11/28/00	Klock et al.
		US 6,139,753		10/2000	Taylor
		US 3,970,738		07/1976	Matsui et al

**FOREIGN PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Translation <sup>6</sup>
		Country Code <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>5</sup> (if known)			
		WO	96/14901		5/23/96		English
		JP	48-59005	A	8/18/73		No
		JP	53-122673	A	10/26/78		No
		JP	63-111990	A	5/17/88		No
		JP	49-43472		11/21/74		
		JP	47-31806		11/13/72		
		JP	50-13294		02/12/75		
		JP	52-126685		10/24/77		
		JP	60-227881		11/13/85		
		JP	49-31152		03/20/74		
		JP	52-113559		09/22/77		
		JP	53-102273		09/06/78		
		JP	48-11291		02/12/73		
		JP	50-96053		07/30/75		
		JP	52-148473		12/09/77		

**NON PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city, and/or country where published.	Translation <sup>6</sup>
		J.C. Ward, The Structure and Properties of Some Iron Sulphides, Rev. Pure and Appl. Chem., 20, 175 (1970), pp. 176-207	
		A. R. Lennie et al., Synthesis and Rietveld Crystal Structure Refinement of Mackinawite, Tetragonal FeS, Mineralogical Magazine, December, Vol. 59, pp. 677-683	
		Cynthia A. Coles et al., Lead and Cadmium Interactions with Mackinawite: Retention Mechanisms and the Role of pH, Environ. Sci. Technol. 2000, 34, pp. 996-1000	
		Claims of CA 1069626, corresponding to JP-A 52-148473	
		Structural and magnetic studies on heavy-metal-adsorbing iron sulphide nanoparticles produced by sulphate-reducing bacteria; Journal of Magnetism and Magnetic Materials, Elsevier Science Publishers, Amsterdam, NL, vol. 214, no. 1-2, May 2000; pages 13-30 XP004198442	

Examiner Signature

Date Considered

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kind Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov), MPEP 901.04 or in the comment box of this document. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST. 3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to indicate here if English language Translation is attached.